UTAH DEPARTMENT OF HEALTH

Candida auris

Disease Plan

Quick Links

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Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ CRITICAL CLINICIAN INFORMATION

Clinical Evidence
Signs/Symptoms • *Candida auris* (*C. auris*) infections can present as septicemia, pneumonia, urinary tract infection and wounds/abscesses. • *C. auris* can also be present as asymptomatic colonization.
Period of Communicability • Patients are communicable whether infected or colonized (colonization is when *C. auris* is present, but the patient does not have symptoms or signs of illness); all current or previously colonized or infected patients should be treated as having the potential for transmission.
Incubation Period • The incubation period is not well defined. • Certain risk factors such as prolonged antibiotic usage, or underlying medical conditions can predispose susceptible individuals to *C. auris* infection.
Mode of Transmission • *C. auris* can survive on environmental surfaces for prolonged periods of time. • *C. auris* can be spread from patient-to-patient through improper healthcare worker hand hygiene. • If present in respiratory tract, *C. auris* can be transmitted via droplet particles. • *C. auris* can be transmitted through any contact with colonized or infected patients.
Laboratory Testing
Type of Lab Test/Timing of Specimen Collection • *C. auris* can be misidentified as other closely related yeast species such as *C. haemulonii*, and requires specialist non-routine laboratory methods. • Colonization screening is available (utilizing PCR methodology) for confirmed cases and potential outbreaks. • Antifungal susceptibility testing (AFST) should be performed on all clinical *C. auris* isolates. • Whole genome sequencing (WGS) can be utilized to study relatedness between isolates and to identify potential outbreaks.
Type of Specimens • Yeast isolate for rule out testing include: sputum, urine, abscesses, wounds (pressure sores), blood sources. • Composite axilla-groin swabs are utilized for colonization screening.
Treatment Recommendations
Type of Treatment • Treatment is recommended only for clinical infection or invasive *C. auris* disease.   ○ Treatment is not recommended for colonized patients.

- The Clinical and Laboratory Standards Institute (CLSI) does not have breakpoints for *C. auris;* however, tentative breakpoints are available as a treatment guideline.

- Antifungal drugs called echinocandins are used to treat *C. auris* infections, although high doses of multiple agents may be required to treat invasive infection since some isolates are resistant to multiple classes of antifungals, including echinocandins.

Time Period to Treat

- Not Defined

Prophylaxis

- None

Contact Management

Isolation of Case

- Contact Precautions
- Enhanced Barrier Precautions, when warranted

Quarantine of Contacts

- None

Infection Control Procedures

- Contact Precautions are recommended for patients/residents who are infected OR who are colonized with colonization screening available, utilizing PCR methodology.
- Contact Precautions include:
  - Performing hand hygiene before donning a gown and gloves.
  - Donning gown and gloves before entering the affected patient/resident's room.
  - Removing the gown and gloves and performing hand hygiene before exiting the patient/resident's room.
- Contact Precautions should be used for all patients/residents with known *C. auris,* whether infected or colonized, especially when performing patient care in acute care hospitals, long-term acute care hospitals, and ventilator units of skilled nursing units.
- Use of Enhanced Barrier Precautions in lower-acuity settings, (e.g. non-ventilator units of skilled nursing facilities and rehabilitation facilities), should be guided by the potential environmental contamination risk, (e.g., urine incontinence that is difficult to contain, or wound drainage that is difficult to contain). Gown and gloves should be used when the potential for exposure to body fluids or secretions exists, such as when the following actions are provided by a healthcare worker:
  - Bathing residents
  - Assisting residents with toileting
  - Changing residents' briefs
  - Changing a wound dressing
  - Manipulating patient devices, (e.g., urinary catheter).

**A full color fact sheet is available from the CDC website.*

✓ WHY IS *CANDIDA AURIS* IMPORTANT TO PUBLIC HEALTH?

Candida auris (*C. auris*) is an emerging multi-drug resistant fungal pathogen, found commonly in healthcare settings abroad.[1] *C. auris* was first identified in 2009 from an inner-ear culture in Japan, and has since spread globally.[10] This fungal infection is a concern not only because of the complexities it requires to treat this pathogen (owing to its multi-drug resistance),[11] but also the fact that it targets a medically vulnerable population.[3]

Patients infected with this fungus run the risk of becoming colonized by the pathogen.[4] Infections from in-dwelling devices, central line infections, and wound infections are common.[10] In such cases, devices can provide a portal for invasive infection with high mortality rates.

This pathogen is highly competitive in healthcare settings and has demonstrated the ability to over-run hospitals and long-term care settings.[11] Further complications come from the ability of this pathogen to survive on abiotic surfaces, and its resistance to typical disinfection procedures.[4]

The first case of *C. auris* in the United States (U.S.) appeared in 2013, and was detected through a retrospective study.[8] *C. auris* is reportable under the Utah Communicable Disease Rule. Additionally, because *C. auris* can be commonly misidentified as *Candida haemulonii (C. haemulonii)*, this organism has also been included in the Utah Reportable Disease Rule. For the most current case numbers by state of *C. auris* in the U.S., refer to the Centers for Disease Control and Prevention (CDC) Tracking *Candida auris* website. Although several cases of *C. auris* have been reported in the U.S., no cases have been reported in Utah to date. Surveillance will provide better understanding regarding transmission, resistance patterns, and treatment response of this emerging pathogen.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

C. auris has been found in bloodstream infections in healthcare settings and is often associated with high mortality rates. In addition to invasive infection, this emerging pathogen can also cause respiratory and urinary tract infections. It can also colonize the skin where no detectable clinical infection is seen; often leading to invasive infection and the potential for spread to other patients.

Causative Agent

C. auris is a yeast in the *Ascomycota* phylum. It forms elongated and ovoid cells that can be seen on a wet-mount. Currently, no hyphae or pseudohyphae growth has been seen. On *Candida* ChromAgar™, it can grow as multi-colony variants that can range from white to mauve, as seen in Image 1. *C. auris* can grow comfortably either at 37°C or 42°C.

***Candida* ChromAgar™ with *C. auris* displaying multi-colony variants (Source: CDC)**

Differential Diagnosis

The presence or suspicion of *C. auris* in clinical settings needs to be ruled out from other yeast isolates.

Laboratory Identification

Although most laboratories can broadly classify yeast, most have limited capabilities to speciate and perform susceptibility testing on yeast isolates. Many laboratories have protocols for submitting yeast isolates to reference laboratories from sterile sites, and from persistent or difficult-to-treat infections. Additional confirmatory testing is necessary to rule out *C. auris* because *C. auris* can often be misidentified as other yeast, especially *C. haemulonii*. *C. auris* requires specialized identification methods. Please note the following CSTE position statement:

> "Some yeast identification methods are unable to differentiate *C. auris* from other yeast species. *C. auris* can be misidentified as a number of different organisms when using traditional biochemical methods for yeast identification such as VITEK 2 YST, API 20C, BD Phoenix yeast identification system, and MicroScan."
>
> (CSTE, 2018 Position Statement 18-ID-05). The full statement can be accessed at CSTE position statement.

Table 1 outlines appropriate diagnostic methods and laboratory reporting protocols approved and not approved for *C. auris* identification. Figure 1 expands on the platforms that incorrectly identify *C. auris*.

Table 1. Commercial methods approved or not approved for the identification of *C. auris* (CDC, 2018)

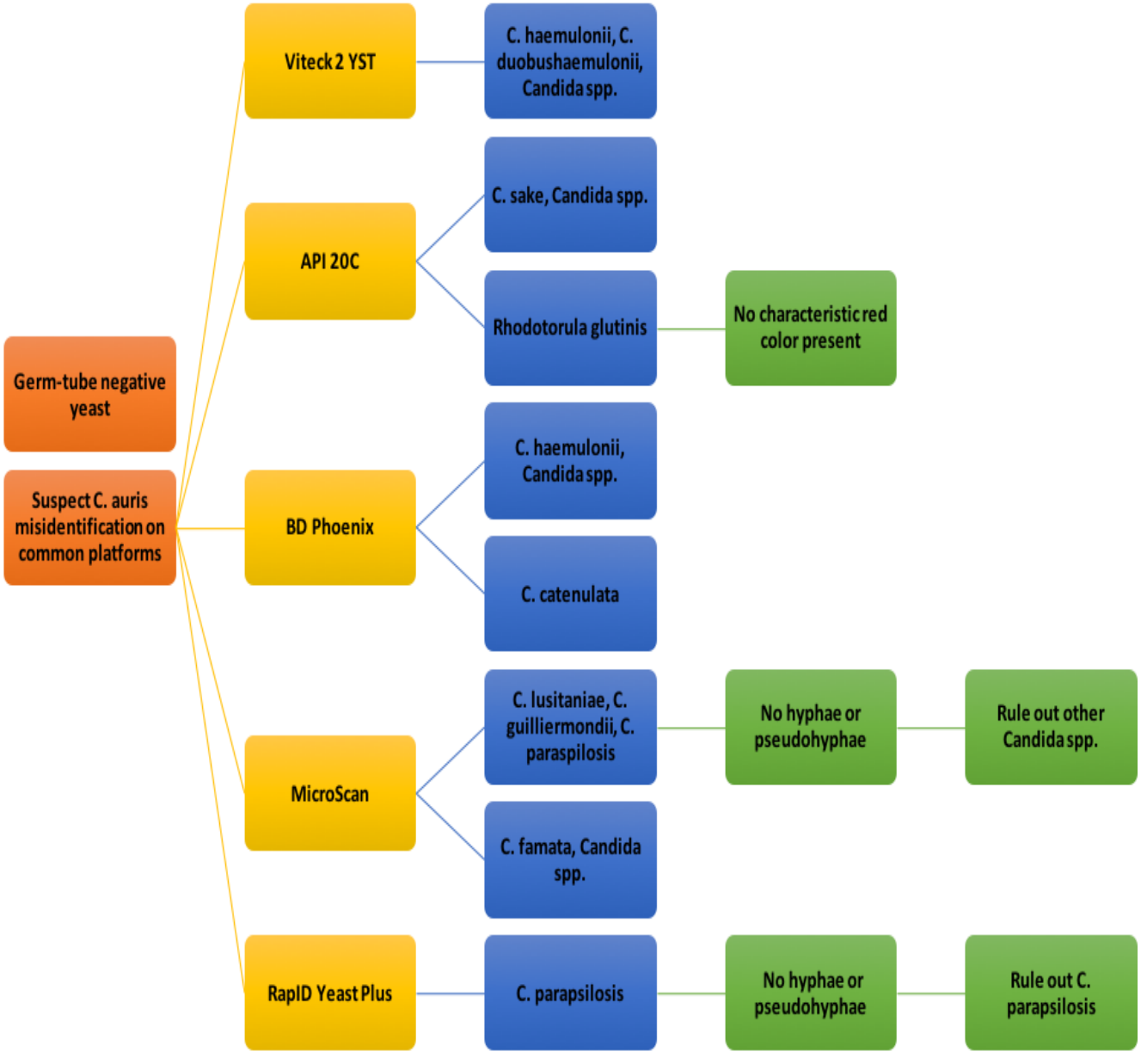
***Methods currently approved for *C. auris* identification**	**Methods NOT currently approved to identify *C. auris***

• Whole genome sequencing or marker gene sequencing of the internal transcribed spacer and D1/D2 regions
• Bruker's 6903 MSP RUO databases for Biotyper
• Specific bioMérieux identification platforms:
  ○ VITEK 2 YST (with Ver 8.01 software)**
  ○ VITEK (MALDI-TOF) MS RUO (with Saramis Ver 4.14 database and Saccharomycetaceae update)
	• API 20C AUX (bioMérieux, Marcy l'Etoile, France)
	• BD Phoenix (BD Diagnostics, Sparks, MD)
	• MicroScan (Beckman Coulter, Pasadena, CA)
	• RapID™ YEAST PLUS System (ThermoFisher Scientific, Waltman, MA)

*Methods are continuously evolving and advancing. This list is up-to-date as of 2018. CDC's MicrobeNet (https://www.cdc.gov/microbenet/index.html) is a tool that provides information for the most relevant laboratory identification methods, including MALDI-TOF, which has been curated by subject matter experts. The Biotyper Classification Module, recently released as a collaboration between CDC and Bruker, provides MicrobeNet users with access to Bruker's most up-to-date database and CDC spectral libraries. The strains of *C. auris* represented in the MicrobeNet database have been proven to accurately classify to the species level on the Biotyper. Source: CSTE 18-ID-05

**Misidentifications of certain clades of *C. auris* has been reported, any *C. haemulonii, C. haemulonii* or non-identified *Candida spp.* identified on this platform would need further work-up to rule out *C. auris.*

Figure 1. Common yeast identification platforms that incorrectly identify *C. auris* as other yeast species



The Utah Communicable Disease Rule requires mandatory reporting to public health and submission of all *C. auris,* (confirmed and suspected), and *C. haemulonii* isolates to the Utah Public Health Laboratory (UPHL) for identification and speciation. Correct identification and reporting of *C. auris* is essential for appropriate containment efforts.

Table 2 summarizes laboratory services offered at UPHL through the Antibiotic Resistance Laboratory Network (ARLN). These include identification via MALDI-TOF (rule-out *C. auris*) and Antifungal Susceptibilities (AFST) for invasive and clinical infections and whole genome sequencing (WGS). UPHL can also perform colonization screening for *C. auris*, although approval by the Utah Department of Health (UDOH) Healthcare-associated Infections Antimicrobial Resistance (HAI/AR) Program is required beforehand. More information about colonization screening can be found at UPHL ARLN website. Additionally, any confirmed

C. auris isolates will be reflexed to AFST and WGS will be performed to further characterize and link organisms to potential outbreaks.

Table 2. Laboratory services offered by UPHL for *C. auris* or other *Candida non-albicans* species

UPHL *Candida* Testing	***C. auris* Rule Out**	**Antifungal Susceptibility Testing (AFST)**	***C. auris* Colonization Screening**
Organism Tested	Any *Candida non-albicans*	Any *Candida non-albicans* detected in a non-sterile source	*C. auris*
Method	MALDI-TOF	Broth Microdilution	PCR
Specimen Collection	Isolated organism from any source collected for diagnosis/treatment	Isolated organism from any source collected for diagnosis/treatment	Bilateral Axilla-Groin E-swab
Transport	Ambient	Ambient	4-8°C**
Stability	Specimens are stable on appropriate media if kept in 4-8°C for one month	Specimens are stable on appropriate media if kept in 4-8°C for one month	Specimens are stable for 4 days after collection

*Confirmed *C. auris* or difficult-to-identify yeast isolates (suspected as *C. auris*) will be reflexed to whole genome sequencing (WGS) for confirmation of ID. WGS sequencing will also be utilized to study relatedness between isolates in potential outbreaks.

Treatment

C. auris is known to be a multi-drug resistant pathogen, often resistant to fluconazole owing to a resistance mutation of the Erg11 mutation.[3] Antifungal drugs called echinocandins are used to treat *C. auris* infections. However, since some isolates are resistant to all three classes of antifungals, high doses of multiple agents may be required to treat invasive infection (Kim et al, 2011). Estimation of U.S. resistance and tentative breakpoints can be found in Table 3 and Table 4**,** respectively. Treatment is not recommended for colonized patients.[3] However, treatment is recommended for invasive site infections, or if there is evidence of clinical disease from *C. auris*. Although *C. auris* is commonly resistant to antifungal drugs, there is variability seen in susceptibility patterns between isolates.[3] As of 2020, there are no Clinical and Laboratory Standards Institute (CLSI) breakpoints available for *C. auris,* but tentative

breakpoints are available. Tentative breakpoints should serve as a guidance, since correlation between clinical outcomes and microbiologic breakpoints are unknown at this time.[3]

Table 3. Estimates of *C. auris* resistance patterns in the U.S., adapted from CDC, 2020

Antifungal Class	% Resistance in U.S.
Azoles***	88% (95-98%)
Polyenes	34%
Echinocandins	3%

*** Fluconazole resistance in the U.S. can vary based on geographic origin and presence of Erg11 resistance mutation.

Table 4. Tentative breakpoints of commonly used antifungal drugs for *C. auris*, adapted from CDC, 2020

Antifungal Agent	Tentative Resistant Breakpoint	Comments
Triazole Drug Class		
Fluconazole	≥32	MIC mode calculations of fluconazole tested by CDC was ≥256; however, resistance mutation of the Erg11 gene responds to an MIC ≥32, corresponding to *C. auris* non-responsive to Fluconazole for treatment.
Second Generation azoles, (e.g., Voriconazole)	N/A	Fluconazole susceptibility can be used as a surrogate for second generation triazole susceptibility assessment. However, isolates resistant to fluconazole may respond to other triazoles occasionally. The decision to treat with another triazole should be made on case-by-case basis.

Table 4 continued

Polyene Drug Class		
Amphotericin B	≥2	If using Etest for amphotericin B and an MIC of 1.5 is determined, that value should be rounded up to 2.
Echinocandin Drug Class		
Anidulafungin	≥4	
Caspofungin	≥2	
Micafungin	≥4	

UPHL is able to conduct AFST for clinical or invasive *C. auris* infections. All therapeutic decisions should be ordered by a medical physician, and consultation with an infectious disease physician is recommended for clinical cases of *C. auris.* There are currently no known decolonization treatments that are effective or recommended for *C. auris*. Colonized patients are at a higher risk for developing invasive *C. auris* infection and should be monitored appropriately. For more information on AFST testing at UPHL, see the ARLN website.

Case Fatality

A meta-analysis of 742 cases of *C. auris* from across the globe determined a crude mortality rate of 29.75%.[9] Other estimates on the case fatality have a range of 30—60% for *invasive C. auris* infections.[11]

Reservoir

C. auris is predominantly associated with healthcare settings, and as of August 2020 there had been no cases of community acquired *C. auris*. In healthcare settings, *C. auris* can readily live on abiotic surfaces and can also be present on the skin of colonized patients. Research has shown that *C. auris* can be cultured for up to 14 days from both dry and moist surfaces, as well as from bedding up to 7 days.[17]

Transmission

Transmission can occur from colonized patients to other susceptible hosts, from infected surfaces in healthcare settings or from the hands of healthcare workers. Droplet transmission can also play a role, especially if infection is in the respiratory system. Transmission can also occur from contaminated surfaces in healthcare settings. For any confirmed or suspect case of *C. auris*, terminal cleaning of any room or any shared equipment is needed. Disinfectants with an EPA claim for *C. difficile* (List K) have been used effectively against *C. auris.*

Susceptibility

Evidence suggests there is a higher risk factor for *C. auris* colonization if the patient has had a history of multi-drug resistant organism (MDRO) infections and high antibiotic usage. Therefore, to prevent the spread of *C. auris* in care settings, early identification of colonized patients is essential. Colonized patients should be placed on Contact Precautions. Most healthy people who come into contact with *C. auris* will not become infected, but can harbor the organism on their skin.

Incubation Period

The incubation period is not well defined. Host susceptibility factors can play a role in transition from colonization to invasive infection, however this is still being investigated.

Period of Communicability

The period of communicability is still under investigation. Currently it is understood that a person colonized with *C. auris* can still transmit *C. auris* to others. There are no current data on the length a person is colonized and can vary person to person, due to a variety of factors. It is assumed that a person is colonized until testing demonstrates a negative result.

Epidemiology

Since *C. auris* surveillance and testing is just beginning, the full public health impact in Utah is unknown and there have not been any identified cases within the state. Containment is the overarching goal. Future surveillance will provide additional knowledge on the transmission, resistance patterns and treatment response of *C. auris*.

While there is limited information regarding *C. auris* and *C. haemulonii,* the following trends have been observed:

- As of November 30, 2020, 1,595 confirmed clinical and 30 probable *C. auris* cases have been reported in the U.S. with an additional 2,400 colonized patients, confirmed by screening. Most of these cases were reporting in northeastern states and California.
- *C. auris* infections can cause septicemia, and have a high mortality rate, particularly in immunocompromised and nursing home patients. Between 30 to 60% of *C. auris* patients die from invasive infection and *C. auris* has been found to colonize the skin of asymptomatic people.
- Principal risk factors for *C. auris* and *C. haemulonii* infection include: recent surgery, recent broad-spectrum antibiotic or antifungal treatment, indwelling catheters, central venous catheters, and exposure to nursing homes and short- and long-term acute care hospitals.[17]

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

Public health will be notified of all *C. auris* cases in Utah and will work with stakeholders for containment and testing needs. Public health will also be involved with case and outbreak management. All *C. auris* investigations are considered a Tier One investigation and should include the actions described in the Outbreak Investigation section in Table 6. Recommended public health actions in different facility settings are summarized in Table 5.

Admission screening is an important tool to prevent the spread of *C. auris* in Utah's healthcare facilities. Outbreaks in healthcare facilities can be traced to undetected colonized patients or misidentification of invasive infection. *C. auris* can spread rapidly in a healthcare setting. The criteria for admission screening selection are based on the risk factors for colonization.

Guidelines for Admission Screening (summarized in Figure 2)

- Patients who have had an overnight stay at a hospital overseas in the past year and have a history of colonization or infection with a carbapenemase-producing organism.
- Patients that come from a healthcare facility that has history of *C. auris* transmission.
- History of care from a facility that has a known outbreak or is in an area that is endemic for *C. auris.*

Figure 2. Guidelines for admission screening of *C. auris*

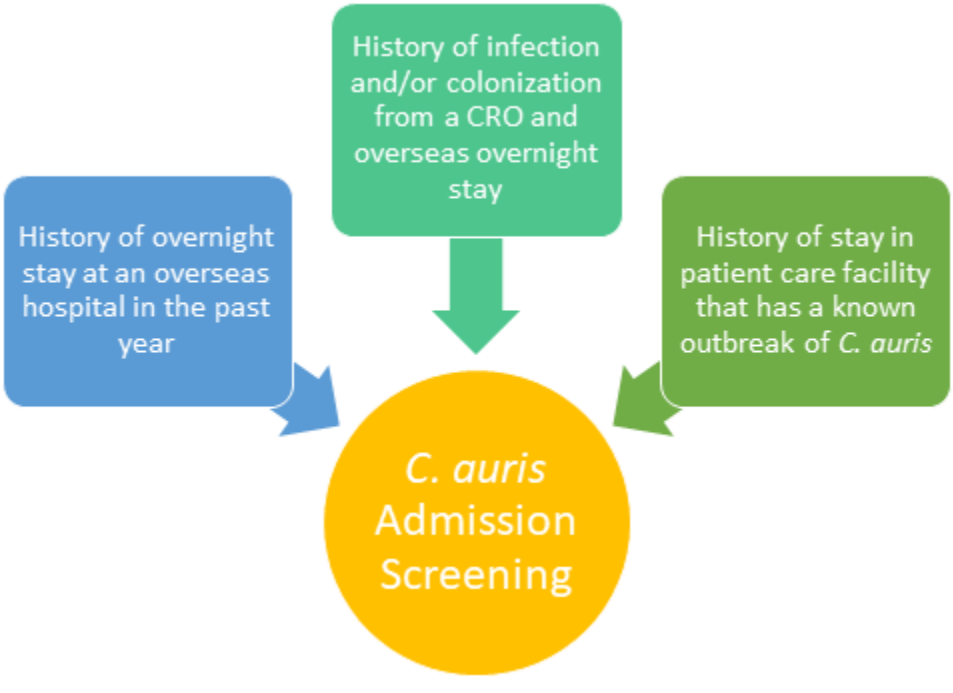


Table 5. Public health recommendations for confirmed *C. auris* for healthcare facilities

Patient Care Facility	Acute Care Setting	Long-Term Care/ Nursing Home	Outpatient Settings	Home Health Care
Full Investigation Conducted by UDOH and local health department (LHD)?	Yes	Yes	Yes	Yes
Standard and Contact Precautions	Yes, until colonization is no longer detected	Yes, until colonization is no longer detected	Yes, until colonization is no longer detected	Yes, until colonization is no longer detected
Enhanced Barrier Precautions for High Contact Activities	N/A	Yes	N/A	N/A
Single Room Occupancy	Yes, cohorting of other *C. auris* patients allowed	Yes, cohorting of other *C. auris* patients allowed	N/A	N/A
Cleaning Recommendations	Daily and terminal cleaning	Daily and terminal cleaning	Terminal cleaning of patient area and equipment	Daily cleaning of patient area and visibly soiled areas
Colonization Screening of Contacts of Case-Patient	Yes	Yes	Yes	Yes
Communication of *C. auris* Status Upon Facility Transfer/ Admission	Yes	Yes	Yes	Yes
Other Recommendations	If there are multiple cases, can consider cohorting patients together	• If there are multiple cases, can consider cohorting patients together • Use of Enhanced Barrier Precautions for High Contact Actives	Dialysis facilities should use a separate room for patient treatment that is not used as a Hepatitis B isolation room	*For Home and Family Members* • Risk of contracting *C. auris* in healthy individuals is very low • Practice good hand hygiene • If family members are providing care, use of disposable gloves is recommended

Prevention

Prevention is multi-faceted and includes multiple infection and prevention and control actions and recommendations:

- Enhanced Barrier Precautions (EBP) and Contact Precautions should be used in long-term care settings and acute care settings respectively.
- Admission screening as outlined in Figure 3 should be appropriately utilized.
- Basic infection control practices such as hand washing and proper PPE use.
- Use of dedicated equipment where possible.
- Terminal environmental cleaning and cleaning of shared equipment with List K products.
- The use of transfer forms documenting colonization status to limit inter-facility spread.

Chemoprophylaxis

There is no known chemoprophylaxis that is available for *C. auris.*

Vaccine

There is no vaccine available for *C. auris.*

Isolation and Quarantine Requirements

(Summarized in Table 5)

Isolation: For patients in long-term care facilities, Contact Precautions as well as Enhanced Barrier Protection should be used when applicable.

Hospital: Patients with positive *C. auris*, either clinical or colonized should be put on Contact Precautions.

Quarantine: No requirements.

✓ CASE INVESTIGATION

Reporting

Per the Utah Communicable Disease Rule, all cases or suspect cases should be reported to public health within three working days. However, immediate notification to the UDOH HAI/AR Program by emailing hai@utah.gov is strongly recommended. Suspect isolates/organisms should also be submitted to UPHL for further testing and investigation. CSTE reporting criteria are summarized in Table 6.

Table 6. CSTE criteria to determine whether a case should be reported to public health

Criterion	Reporting
Clinical Evidence	
None	
Laboratory Evidence	
Detection of *C. auris* in a specimen using either culture or a culture independent diagnostic test (e.g., PCR)	S
Detection of an organism that commonly represents a *C. auris* misidentification in a specimen by culture. (See Figure 1. for a comprehensive list).	S
Epidemiological Evidence	
None	

Notes: S = This criterion alone is sufficient to report a case. A requisition or order for any of the "S" laboratory tests is sufficient to meet the reporting criteria. Source: CSTE 18-ID-05

Case Definition
C. auris (2018)

Confirmed

Clinical invasive or non-invasive: Person with confirmatory laboratory evidence from a clinical specimen collected for the purpose of diagnosing or treating disease in the normal course of care. This includes specimens from sites reflecting invasive infection (e.g., blood, cerebrospinal fluid) and specimens from non-invasive sites such as wounds, urine, and the respiratory tract, where presence of *C. auris* may simply represent colonization and not true infection.

Colonization: Person with confirmatory laboratory evidence from a swab collected for the purpose of screening for *C. auris* colonization regardless of site swabbed. Typical colonization/ screening specimen sites are skin (e.g., axilla, groin), nares, rectum, or other external body sites. Swabs from wound or draining ear are considered clinical.

Probable

Clinical invasive or non-invasive: Person with presumptive laboratory evidence from a clinical specimen collected for the purpose of diagnosing or treating disease in the normal course of care and evidence of epidemiologic linkage. A clinical specimen includes specimens from sites reflecting invasive infection (e.g., blood, cerebrospinal fluid) and specimens from non-invasive sites such as wounds, urine, and the respiratory tract, where presence of *C. auris* may simply represent colonization and not true infection.

Colonization: Person with presumptive laboratory evidence from a swab collected for the purpose of screening for *C. auris* colonization regardless of site swabbed. Typical colonization/ screening specimen sites are skin (e.g., axilla, groin), nares, rectum, or other external body sites. Swabs from wound or draining ear are considered clinical.

Suspect

Person with presumptive laboratory evidence from a clinical specimen collected for the purpose of diagnosing or treating disease in the normal course of care and no evidence of epidemiologic linkage. A clinical specimen includes specimens from sites reflecting invasive infection (e.g., blood, cerebrospinal fluid) and specimens from non-invasive sites such as wounds, urine, and the respiratory tract, where presence of *C. auris* may simply represent colonization and not true infection.

Figure 3. Cheat sheet summary of definitions for suspect, probable and confirmed cases of *C. auris*

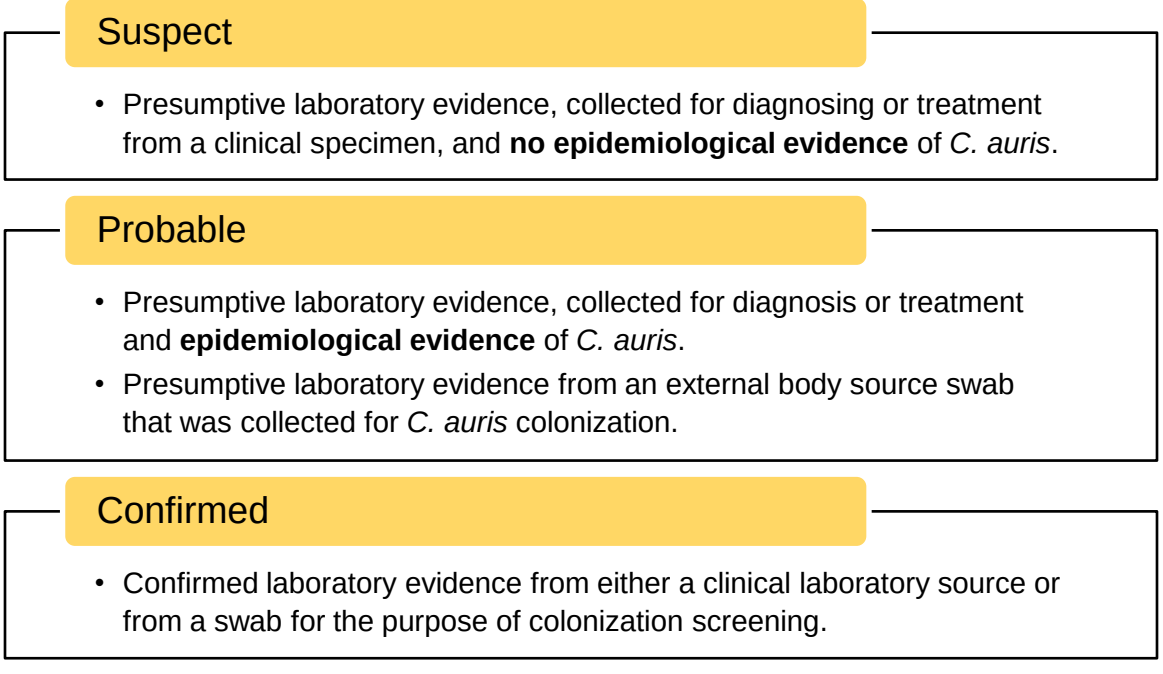


Table 7. CSTE criteria for defining a case of *C. auris*

	Clinical Cases			**Colonization/Screening Cases**	
	Clinical Suspect	**Clinical Probable**	**Clinical Confirmed**	**Colonization/ Screening Probable**	**Colonization/ Screening Confirmed**
Clinical evidence					
None					
Laboratory evidence					
Detection of *C. auris* from any body site using either culture or culture independent diagnostic test (e.g., PCR)			N		N
Detection of *C. haemulonii* from any body site using a yeast identification method not able to detect *C. auris* (see Figure 1.)	N	N		N	
Clinical specimen was obtained during the normal course of care	N	N	N		
Specimen from a swab was obtained for the purpose of colonization screening				N	N
Isolate/specimen is not available for further testing or has not yet undergone further testing	N	N		N	
Epidemiologic evidence					
Resided within the same household with another person with confirmatory or presumptive laboratory evidence of *C. auris* infection or colonization		O			
Received care in the same healthcare facility as another person who had confirmatory or presumptive laboratory evidence of *C. auris* infection or colonization within the prior 12 months		O			

Table 7. continued

Received care in a healthcare facility that commonly shares patients with another facility that had a patient with confirmatory or presumptive laboratory evidence of *C. auris* infection or colonization within the prior 12 months		O			
Stayed overnight in a healthcare facility in the previous one year in a foreign country with documented *C. auris* transmission		O			
Absence of epidemiologic link to a confirmed case	N				
Criteria to distinguish a new case					
For clinical cases, count patient once regardless of if a new event occurs	N	N	N		
For colonization/screening cases, count patient only once regardless of the interval between testing (assumes patient is always colonized)				N	N
A person with a colonization/screening case can later have a separate clinical case	N	N	N	N	N
A patient with a clinical case should not be counted as having a colonization/screening case thereafter	N	N	N	N	N

Notes:

N = All “N” criteria in the same column are NECESSARY to classify a case. A number following an “N” indicates that this criterion is only required for a specific disease/condition subtype (see below). If the absence of a criterion (i.e., criterion NOT present) is required for the case to meet the classification criteria, list the absence of criterion as a necessary component.

O = At least one of these “O” (ONE OR MORE) criteria in each category (categories=clinical evidence, laboratory evidence, and epidemiologic evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to classify a case. A number following an “O” indicates that this criterion is only required for a specific disease/condition subtype. Source: CSTE 18-ID-05

Case Investigation Process

A full case investigation should be conducted on all probable and confirmed clinical and surveillance cases of *C. auris* by LHD investigators or designated state epidemiology personnel. This involves the investigator filling out the Case Investigation Form in Appendix A which aims to gather risk factor and facility history information which should be used to identify potential contacts. The completed form should be attached under the notes section of UT-NEDSS (EpiTrax) and case status should be set in UT-NEDSS (EpiTrax) and then reviewed at the state level. A thorough facility history is necessary for populating the clinical tab in UT-NEDSS (EpiTrax) to enable the facility-centric module to be used to identify potential outbreaks.

a. Suspect cases

Public health epidemiology action: No investigation is usually necessary. Coordinate with the facility to ensure contact precautions and facility transfer communication. Close case.

Facility action: Contact Precautions recommended for duration of stay. Communicate status upon facility transfer.

b. Probable cases

Public health epidemiology action: If the case is newly-transmitted, conduct a *C. auris* case investigation. Use the Case Investigation Form in Appendix A. Support laboratory efforts for identification of infection and/or colonization.

Facility action: Contact Precautions recommended for duration of stay. Communicate status upon facility transfer.

c. Confirmed cases

In Utah, confirmed cases will include *C. auris/haemulonii*—both clinical and screening isolates/testing.

Public health epidemiology action: If the case is newly transmitted, conduct a *C. auris* case investigation. Use the Case Investigation Form in Appendix A. If facility transmission is suspected, offer an onsite assessment of the facility's infection prevention and control program. Increased suspicion of facility transmission may be cause to begin an outbreak investigation. Conduction of *C. auris* colonization screening for patients that have had contact with case-patient is strongly recommended.

Facility action: Contact Precautions recommended for duration of stay. Communicate status upon facility transfer. *C. auris status must be communicated to receiving facility in any facility transfer events.* Use the Utah Infection Control Transfer Form for patient transfer between facilities.

d. Not a case

No public health action is needed for *Candida* spp. or other yeast species that have been ruled out as *C. auris*. These events should be closed in UT-NEDSS (EpiTrax) as "not a case."

Outbreaks

An outbreak is defined as one case of *C. auris*, since there has been no previous *C. auris* detected in Utah and requires a full investigation. Outbreak investigations for confirmed and probable cases of *C. auris* fall under a Tier One investigation which includes the activities outlined in Table 8 and an onsite visit with an infection control assessment, lab lookback and prospective surveillance. Also, conducting a point prevalence screening is recommended on any contacts of the case(s), which includes both healthcare and household contacts along with any roommates. Other activities such as environmental sampling and healthcare personnel screening would be conducted on an as-needed basis only. All *C. auris* isolates from both clinical and environmental sources should be reflexed to sequencing. Whole genome sequencing (WGS) results can be utilized to produce relatedness trees of *C. auris* isolates and identify potential outbreaks.

Follow the actions and complete the checklist form in Appendix B, *C. auris* Response Plan, to respond to suspected case(s) of *C. auris*.

Table 8. Recommended Tier One investigation activities for *C. auris* case and outbreak investigations

Tier-One Outbreak or Complex Investigation	
List of Applicable Organisms or Conditions	VRSA, *C. auris/haemulonii*, novel carbapenemase producers, pan-resistant organisms or outbreaks
Onsite Visit	Recommended
Infection Control Assessment	Recommended
Prospective Surveillance	Recommended
Laboratory Lookback	Recommended
Screening of Healthcare Roommates	Recommended
Broader Screening of Healthcare Contacts	Recommended
Household Contacts Screening	Recommended
Environmental Sampling	As Needed
Healthcare Personnel Screening	As Needed

Identifying Case Contacts

Once identified, case contacts should be screened with sampling using an axillary/groin swab for *C. auris* using a ring surveillance strategy. This involves starting with the highest risk/closest contacts, e.g., roommates and moving outwards to broader healthcare contacts, e.g., those sharing services such as wound and respiratory care. Case contacts include, but are not limited to:

- Roommates or close contacts of the positive case
- Shared services (e.g., wound care, physical therapy, urology services)
- Other patients in the same unit or patients cared for by the same healthcare staff.

For more information, refer to the *C. auris* Response Plan in Appendix B.

Case Contact Management

- Colonization screening of facility; recommended at two-week intervals
    - Rescreening of known positives is not recommended
- Isolation/cohorting of those who are positive
- Contact precautions and enhanced barrier precautions
- Terminal cleaning of patient area such as bedrails and linens and of shared equipment, e.g., physical therapy equipment
- Use of dedicated equipment e.g., blood pressure cup and lift sling where possible
- Use of Transfer forms link to notify next provider and any outpatient provider of colonization status.
- Call with stakeholders for coordination of containment and case management.

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✓ VERSION CONTROL

V. 01/26/2021: Created new disease plan.

✓ UT-NEDSS (EPITRAX) MINIMUM/REQUIRED FIELDS BY TAB

Demographic

- First name
- Last name
- Age
- Date of birth
- Date of death
- Phone number
- Area code
- County
- Birth gender
- Race
- Street
- City
- State
- Zip Code

Clinical

- Admission date
- Clinician first name
- Clinician last name
- Clinician phone
- Date diagnosed
- Died
- Date of death
- Diagnostic facility
- Disease
- Health facility
- Hospitalized
- Onset date

Laboratory

- Collection date
- Lab
- Organism
- Result value
- Specimen source
- Test result
- Test type
- Units

Epidemiological

- Date of exposure
- Exposure city
- Exposure name
- Exposure place type
- Food handler
- Group living
- Healthcare worker
- Imported from
- Other Data 1
- Other Data 2

Investigation

- Had a fever and pneumonia
- Other relevant details:
- Date patient admitted to reporting facility?
- Was patient transferred from another facility?
- Transferred from where?
- Type of facility patient was transferred from
- Date of transfer
- Was this infection healthcare facility acquired?
- Has the healthcare facility taken measures to prevent further spread of organism, if warranted?

Contacts

- N/A

Reporting

- Date first reported to public health

Administrative

- LHD investigation/intervention started
- Outbreak-associated
- Outbreak name
- State case status

✓ *CANDIDA AURIS* INFECTION RULES FOR ENTERING LABORATORY TEST RESULTS

The following rules describe how laboratory results reported to public health should be added to new or existing events in UT-NEDSS (EpiTrax). These rules have been developed for the automated processing of electronic laboratory reports (ELR), although they apply to manual data entry, as well.

Test-Specific Rules

Test specific rules describe what test type and test result combinations are allowed to create new morbidity events in UT-NEDSS (EpiTrax), and what test type and test result combinations are allowed to update existing events (morbidity or contact) in UT-NEDSS (EpiTrax).

Test Type	Test Result	Create a New Event	Update an Existing Event
C. auris culture	Positive	Yes	Yes
	Negative	No	Yes
	Indeterminate	Yes	Yes
C. haemulonii culture	Positive	Yes	Yes
	Negative	No	Yes
	Indeterminate	Yes	Yes
Other rare *Candida* spp. or *Candida spp*. from sterile sites implicated in invasive disease that cannot be accurately speciated**	Positive	Yes	Yes
	Negative	No	Yes
	Indeterminate	Yes	Yes
C. auris PCR	Positive	Yes	Yes
	Negative	No	Yes
	Indeterminate	Yes	Yes
C. haemulonii PCR	Positive	Yes	Yes
	Negative	No	Yes
	Indeterminate	Yes	Yes

**Exclude *C. albicans, C. parapsilosis, C. dubliniensis, C. lusitaniae*, *C. tropicalis,* and *C. kruseil* and any other yeast infections that do not fit the above criteria.

Whitelist Rules

Whitelist rules describe how long an existing event can have new laboratory data appended to it. If a laboratory result falls outside the whitelist rules for an existing event, it should not be added to that event, and should be evaluated to determine if a new event or Client Medical Record (CMR) should be created.

***C. auris* infection Morbidity Whitelist Rule:** Never a new case

***C. auris* infection Contact Whitelist Rule:** If the specimen collection date of the laboratory result is six months or less after the date of the contact event, the laboratory result should be added to the contact event.

Graylist Rule

We often receive laboratory results through ELR that cannot create cases, but can be useful if a case is created in the future. These laboratory results go to the graylist. The graylist rule describes how long an existing event can have an old laboratory result appended to it.

***Candida auris* infection Graylist Rule:** If the specimen collection date of the laboratory result is three before to three months after the event date of the morbidity event, the laboratory result should be added to the morbidity event.

Other Electronic Laboratory Processing Rules

- If an existing event has a state case status of “not a case,” ELR will never add additional test results to that case. New labs will be evaluated to determine if a new CMR should be created.

✓ APPENDIX A - *Candida auris* Case Investigation Form

PATIENT DEMOGRAPHICS				
First name:		Middle name:		
Last name:				
Date of birth:				
Parent/Guardian:				
Address:				
City:	State:		Zip:	
Is this address for a long-term care hospital or nursing home?	❑ Yes	❑ No		
Name of facility:	Facility type:			
Phone number:	Sex: ❑ M ❑ F			
Email address:				
Primary language:				
Ethnicity		Race		
❑ Not Hispanic or Latino	❑ Hispanic or Latino	❑ White	❑ Black or African American	
		❑ American Indian or Alaska Native	❑ Asian	
		❑ Native Hawaiian or Other Pacific Islander	❑ Unknown	

CLINICAL INFORMATION				
Onset date (first date of symptoms):		Date of *Candida spp.* specimen collection:		
Type(s) of sample (check all that apply)				
❑ Unknown	❑ Blood	❑ Urine	❑ Sputum	❑ Bronchoalveolar Lavage (BAL)
❑ Wound	❑ Other sterile site:			
Type of case	❑ Clinical	❑ Screening/Surveillance		

If clinical case, did patient previously have a positive screening or surveillance culture?	❑ Yes	❑ No
Was Antifungal Susceptibility testing (AFST) performed?	❑ Yes	❑ No
If AFST was performed, record MICs.		
Fluconazole	Voriconazole	Amphotericin
Micofungin	Caspofungin	Anidulafungin

LABORATORY REPORT FORM			
What methods are used for AFST?			
❑ Broth Microdilution	❑ E-test	❑ Automatic	❑ Other

Was it initially misidentified?	❑ Yes	❑ No
If yes, which method was used?	❑ API 20C Aux	❑ VITEK-2
❑ Phoenix	❑ MicroScan	❑ Other:
If yes, as what?	❑ *Candida haemulonii*	❑ *Candida famata*
❑ *Candida sake*	❑ *Candida spp.*	❑ Other
Was the patient known to be colonized with any other multidrug-resistant organisms, (e.g., CRE, CRA, CRPA MRSA, or VRSA)?	❑ Yes (please specify):	❑ No

HEALTHCARE ENCOUNTERS		
At the time of *C. auris* specimen collection, was the patient admitted in a healthcare facility?	❑ Yes	❑ No

Facility name:	Facility type:	
Facility address:	Was the patient in Contact Precautions for the duration, or part of their stay?	Was this infection healthcare facility acquired? (In a facility 2 days prior to culture collection and no previous positive culture?)

Facility city:	Facility state:	Facility ZIP:	❑ Duration	❑ Part of stay	❑ Yes	❑ No

Was the patient admitted to the facility?	❑ Yes	❑ No	Admit date:	Discharge date:	
			Died from illness?	❑ Yes	❑ No	Date of death:

From where was the patient admitted?	❑ Home	❑ Facility, specify:	❑ Other:
To where was the patient discharged?	❑ Home	❑ Facility, specify:	❑ Other:

Was the patient admitted to an intensive care unit (ICU) in the past 6 months?	❑ Yes	❑ No	Facility name: Length of stay:	
Date of admission to the ICU	___/___/____		Date of discharge from the ICU	___/___/____

Locations of patient during hospitalization

Unit/floor:	Room:	Dates: ___/___/____to___/___/____	On Contact Precautions?	
			❑ Yes	❑ No
Unit/floor:	Room:	Dates: ___/___/____to___/___/____	On Contact Precautions?	
			❑ Yes	❑ No
Unit/floor:	Room:	Dates: ___/___/____to___/___/____	On Contact Precautions?	
			❑ Yes	❑ No
Unit/floor:	Room:	Dates: ___/___/____to___/___/____	On Contact Precautions?	
			❑ Yes	❑ No

Did the patient have a roommate (or ward mates, if general ward) at any point while not on Contact Precautions?	❑ Yes	❑ No

RISK FACTORS			
Was the patient admitted to an ICU in the past 6 months?	❑ Yes	❑ No	Facility name: Month/year:
Was the patient transferred to any other facility from the reporting facility?	❑ Yes	❑ No	Receiving facility name: Month/year:

❑ Acute care hospital	❑ Long-term care facility	❑ Long-term acute care hospital

Was MDRO status communicated to the receiving facility (Facility Transfer Form used)?	❑ Yes	❑ No
Has the patient had any surgical procedures in the past year?	❑ Yes	❑ No
List surgical procedures:		
Has the patient had any out-patient procedures in the past year?	❑ Yes	❑ No
List out-patient procedures:		
Is the patient bed-bound?	❑ Yes	❑ No

Underlying medical conditions (check all that apply)

❑ Diabetes	❑ Hemodialysis	❑ Chronic Liver Disease	❑ Chronic Respiratory Disease	❑ Chronic Renal Disease
❑ HIV (not AIDS)	❑ AIDS/CD4 count >200	❑ Transplant Recipient	❑ Other immunosuppressed state:	
❑ Cancer:		❑ Other:		

Has the patient had exposure to any of the following devices in place in the past 6 months? (check all that apply)

❑ Mechanical ventilation	❑ Central venous catheter	❑ Peripheral IV	❑ Dialysis catheter
❑ Urinary catheter	❑ Endotracheal intubation	❑ Gastrostomy tube	❑ NG tube
❑ Tracheostomy	❑ Nephrostomy tube	❑ Surgical drain	❑ Hemodialysis

❑ Intra-abdominal drain or catheter	❑ Surgical drain	❑ Other surgical procedure or device (please specify):	❑ Intra-abdominal drain or catheter

TRAVEL HISTORY

Has the patient traveled outside of the country in the past year?		Location:	Date:
❑ Yes	❑ No	Location:	Date:
Did the patient receive medical care outside of the U.S.?		Location:	Date:
❑ Yes	❑ No	Location:	Date:

TREATMENT HISTORY

In the **2 weeks** prior to the *C. auris* specimen collection:

Did the patient receive broad spectrum antibiotics?	❑ Yes	❑ No
Did the patient receive antifungal medication?	❑ Yes	❑ No
If yes, please specify antifungal (e.g., fluconazole):		
After the *C. auris* was identified, did the patient receive antifungal medication?	❑ Yes	❑ No

If yes, please specify antifungal (e.g., fluconazole) and treatment dates:

_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____
_____	___/___/____to___/___/____

CONTACTS

Please list all contacts below and indicate if they are a familial contact, healthcare worker contact, or facility roommate.

Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:

Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Name:	Phone number:	Contact type:
Additional notes:		

✓ APPENDIX B - *Candida auris* Response Plan

UDOH: *Utah Department of Health,* ***UPHL:*** *Utah Public Health Laboratory,* ***LHD:*** *Local Health Department,* ***IP:*** *Infection Preventionist,* ***ICS:*** *Incident Command Structure,* ***HAI/AR:*** *Healthcare-associated Infections/Antimicrobial Resistance Program,* ***ARLN*:** *Antibiotic Resistance Laboratory Network,* ***MALDI:*** *Matrix Assisted Laser Desorption/Ionization.*

Immediate actions

Public health actions

- ❑ Notify UDOH chain of command — Date completed_____
  - HAI/AR Program Manager
  - Bureau of Epidemiology Director
  - State Epidemiologist
  - All of HAI/AR Program
- ❑ Notify relevant LHD contacts — Date completed_____

Facility IP actions

- ❑ Communicate with IPs to ensure they are aware of the situation
  Date completed_____
- ❑ Send IPs the Infection Prevention and Control for *Candida auris* document (https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html) and CDC Fact Sheet (https://www.cdc.gov/fungal/candida-auris/pdf/C-Auris-Infection-Factsheet-H.pdf)
- ❑ Isolate the patient(s) — Date completed_____
- ❑ Switch to using a List K cleaning agent (https://www.epa.gov/pesticide-registration/list-k-epas-registered-antimicrobial-products-effective-against-clostridium)
  Date completed_____

Clinical lab actions

- ❑ Contact clinical lab — Date completed_____
- ❑ Ensure the lab saves the isolate and request that the lab sends the isolate to UPHL for further testing — Date completed_____
- ❑ If there are questions about coordinating isolate shipment to UPHL, contact Nancy Arbon narbon@utah.gov (801) 965-2156
  Date completed_____

UPHL

- ❑ Notify the Infectious Disease Chief Scientist and Microbiology Technical Supervisor about the situation so they can be on the lookout for the isolate
  Date completed_____
- ❑ UPHL will identify the isolate with MALDI — Date completed_____

After *Candida auris* case is confirmed

- ❑ Initiate public health coordination call (should mimic an ICS call)
  Date completed_____

  - Who should be involved?
    - UDOH
      - HAI/AR investigator(s)
      - HAI/AR IP(s)
      - HAI/AR Program Manager
      - Bureau of Epidemiology Director
      - State Epidemiologist
    - LHD
      - HAI investigator
      - Local Health Officer
    - UPHL
      - Infectious Disease Chief Scientist
      - Microbiology Technical Supervisor
      - NGS Chief Scientist
      - ARLN Regional Lab Coordinator

  - Call objectives
    - Use HAI outbreak template to determine roles and responsibilities of UDOH and LHD
    - Schedule time for next call with the facility(ies)

- ❑ Set up a call with CDC (haioutbreak@cdc.gov) Date completed_____

  - Discuss plan and ensure that we are planning all of the appropriate containment actions

- ❑ Coordinate with LHD to call IP and/or clinical lab Date completed_____

  - Request all non-albicans yeast isolates, excluding vaginal sources, in the preceding 6 months to identify other potential causes
  - Conduct case investigation of index patients(s) and enter the cases into EpiTrax

- ❑ Set up a call with public health/relevant facilities Date completed_____

  - Who to include?
    - IP and leadership at the facility where the patient was diagnosed
    - IP and leadership at facility where the patient is currently admitted (if transferred)
    - IP and leadership at any facility where the patient was in the 6 months prior to diagnosis
    - UDOH
    - UPHL (including ARLN Lab Coordinator)
    - LHD

  - Call objectives
    - Discuss overview of the current situation
    - Discuss the tiered investigation activities
    - Schedule an onsite facility visit

- Conduct an Infection Control Assessment and Response (ICAR) interview
- Conduct infection control observations
- Discuss recommendations for colonization screening
- Compile a list of high-risk patients for screening
    - Roommates
    - Any patients with shared services and/or shared equipment with index cases(s)
    - Any patients with a carbapenem-resistant organism (CRO)
    - Any patients with travel history (international travel or travel from any states with identified cases of *Candida auris*).

- Ask facility to provide a few dates for screening. The ARLN Lab Coordinator will schedule the screening and ensure the lab has capacity to process and test the samples on the requested dates.
    - Generally, this needs to be completed Monday-Wednesday.